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Is the Design and Technology Pedagogy in Botswana's Senior Secondary Schools Aligned with 21st Century Skills?

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Abstract: The 21st century has ushered in a period of rapid technological advancement and significant shifts in the global economy. This has underscored the importance of developing 21st-century skills in education. This study delves into the alignment of Botswana's senior secondary schools' Design and Technology (D&T) teaching and learning pedagogies with the acquisition of 21st-century skills. A case study approach was employed, utilising surveys, interviews, and classroom observations to gather data from teachers, school heads, students, and club coaches. The focus was on how the D&T curriculum aligns with vital 21st-century skills, such as critical thinking, creativity, collaboration, communication, and digital literacy. The findings indicate that while Botswana's D&T curriculum incorporates elements relevant to 21st-century skills, there is room for improvement in its alignment with modern pedagogical approaches. This study's insights are particularly relevant for educators in Botswana's senior secondary schools, as it offers recommendations for enhancing the alignment between curriculum and pedagogy, thereby better preparing students for the challenges of the 21st-century job market.

Keywords: case study, curriculum, design and technology, pedagogy, 21st-century skills

1. Introduction

The 21st-century skills, also known as 'future skills' or 'soft skills', are competencies and abilities considered essential for success in the modern world beyond just the technological realm (Rios, Joseph & Ling, Guangming & Pugh, Robert & Becker, Dovid & Bacall, Adam, 2020). Labour market surveys highlight the demand for a workforce that possesses 'soft skills' and higher-order thinking skills (Guàrdia et al., 2021). As educational systems worldwide increasingly emphasize the importance of 21st-century skills, it is crucial to assess whether Botswana's curriculum and teaching methods align with these contemporary demands. Understanding this alignment, or lack thereof, will provide valuable insights into potential gaps in the education system, such as graduate skills mismatch and inform necessary curriculum reforms.

2. Literature Review

Papadakis et al (2023) offers a concise overview of two educational technology workshops, CSTOE 2022 and CoSinE 2022, held in Kyiv, Ukraine, which examined the role of cloud computing, artificial intelligence, and computer simulation in enhancing open and STEM education. Drawing from peer-reviewed papers and case studies, the findings highlight the benefits of smart technologies in promoting personalized learning, data-driven decision-making, and learner engagement. While the article effectively summarizes emerging trends and emphasizes the importance of ethical AI use and

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global collaboration, it remains largely descriptive and lacks detailed methodological explanation or empirical evidence. The absence of discussion on implementation challenges, teacher readiness, and infrastructural inequalities limits its practical applicability. Nonetheless, the article contributes to the broader discourse on digital transformation in education and provides valuable insights into the potential of technology to advance inclusive, data-informed, and future-oriented learning environments.

The current study gathers primary data from Botswana (senior secondary D&T classrooms), providing locale-specific evidence about pedagogy and 21st-century skills in a context that is under-represented in global reviews.

The 6th International Workshop on Augmented Reality in Education (AREdu, 2023) explored the integration of AR, AI, and VR in education, highlighting their potential to enhance engagement and conceptual understanding. However, the workshop focused mainly on technological innovation rather than empirical evidence of pedagogical effectiveness, with limited attention to implementation within specific subjects or in developing contexts. It also lacked discussion on how emerging technologies foster 21st-century skills such as creativity, problem-solving, and collaboration. In contrast, the current study addresses these gaps by empirically examining how Design and Technology (D&T) pedagogies in Botswana support 21st-century competencies. By focusing on teacher practice, curriculum alignment, and contextual challenges in a developing education system, the study bridges the gap between technological innovation and practical classroom application, offering localized insights often missing in global discourse.

3. Brief Overview of Technology in Botswana and Its Use in Education

The inception policy for Education, known as the Education for Kagisano (Social Harmony), governed and steered the progression of education from 1977 to 1993, Education and Training Sector Strategic Plan (ETSSP: 2015-2020). Due to changes as the years passed by, the need for a review of the policy was evident; hence, in the early 1990s, the policy was reviewed, which led to the inception of the Revised National Policy on Education, commonly known as (RNPE, 1994). The RNPE has been providing the framework for developing education in Botswana since 1994. One of the overall objectives of the National Policy on Education is to emphasise science and technology in the education system. Economic diversity showed some gaps in the educational system, which called for a more robust intervention, hence the birth of the Education and Training Sector Strategic Plan (ETSSP: 2015-2020), derived from the RNPE. The ETSSP contributes to the implementation of Outcome-Based Education and Multiple Pathways reforms. Some of the critical priorities of ETSSP are to improve the learning outcomes, develop new pathways for education and integrate ICT into learning and teaching.

Botswana Vision 2036 explicitly calls for the development of a knowledge-based economy, focusing on innovation, research, and technology. The current National Development Plan (NDP) 11 aligns with Vision 2036 and emphasises economic diversification, with a focus on developing the private sector, innovation, and ICT. National ICT Policy (Maitlamo), which was launched in 2007, aims to create a conducive environment for ICT development and use in Botswana. Botswana has also introduced the Ministry of Communications, Knowledge and Technology (MCKT), which deals with ICT and development. MCKT is responsible for digitisation, which has the immense potential to unlock and enable high productivity and efficiency in Batswana.

Botswana's Ministry of Education and Skills Development commenced the delivery of the school digitalisation project. This project aligns directly with the National Reset Agenda priority number three – 'digitalisation' - and the ETSSP priority ten (10), which is the utilisation and integration of Information Communications Technology (ICT). The School Digitalisation project aims to implement

Information Communication Technology-based teaching and learning in schools. Digitalisation focuses on schools' internet connectivity, the use of ICT as a platform for teaching and learning, the development of e-content, capacity building of teachers, the provision of the individual learner and teacher ICT gadgets, and the introduction of ICT-related subjects at the basic education level.

Botswana has been actively working to align its educational system with the objective of equipping students with 21st-century skills. The development of the National Human Resource Development Strategy and the National Credit Qualifications Framework ensures that education remains relevant to the needs of the 21st century. The General Curriculum and Assessment Framework (GECAF, 2023) is a strategic move through which the Botswana education system provides 21st-century skills to its citizens. GECAF will be implemented through an education programme that will introduce pedagogical approaches that will support the attainment of 21st-century skills. GECAF recommends D&T syllabi subscription to the following teaching and learning methods to attain 21st-century skills: differentiated learning, project-based learning, expeditionary learning and anytime, anywhere learning and on demand.

This study supports the ongoing efforts to recognise the importance of aligning teaching methods in Botswana schools, particularly in Design and Technology (D&T), to demonstrate 21st-century skills. The study addresses the following research questions:

1. Which pedagogies are used by D&T teachers in Botswana senior secondary schools to support the attainment of 21st-century skills?

2. To what extent do D&T pedagogical approaches used by teachers demonstrate 21st-century skills?

3.1. Theoretical framework

This study adopted the integration of the Analyse, Strategize, Implement and Evaluate (ASIE) theoretical framework model with the TPACK framework. TPACK is a framework that integrates Technological Knowledge, Pedagogy Knowledge, and Content Knowledge in a learning context (Wibowo in Idrus & Saleh, 2022). According to Susana in Idrus & Saleh (2022), TPACK emphasises three key components: technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). ASIE is a learner-centred approach that raises teachers' awareness of 21st-century learning skills and gives learners equal opportunities in the learning process. The learning process with technology integration is known as TPACK (Nouval Nanola et al., 2024). Santos and Castro (2021) define TPACK as the effectiveness of the delivery of lessons with technology integration. The 21st-century Learning Framework acts as a teacher's guideline by outlining components needed for a critical and creative learning environment.

1) Integrating theoretical frameworks ensures a systematic, reflective, and adaptable approach to teaching D&T.

2) It fosters the advancement of 21st-century skills, encouraging critical thinking by students and innovatively, while leveraging technology in practical design challenges.

3) The combined framework supports both students and teachers in effectively navigating complex, technology-rich learning environments.

This synergy between ASIE and TPACK transforms D&T pedagogy, creating a dynamic, student-centred, and future-ready educational experience.

4. Research Method

A mixed-method approach was adopted because it can be valuable for assessing D&T programmes and teaching methods and exploring the experiences and perspectives of students, teachers, and club coaches. The mixed method provides a more robust and comprehensive understanding of research topics and enhances the overall quality and validity of research outcomes (Timans, Wouters & Heilbron, 2019). This study used a case study design approach. According to Gustafsson (2017), a case study is an intensive, systematic investigation of a single

individual, group, community, or other unit in which the researcher examines in-depth data relating to several variables.

The study population, which in this case is the pilot population of the main study, included 50 Design and Technology students in two of Botswana's senior secondary schools in the South East region, six D&T teachers, two school heads and two D&T/robotic/coding club coaches. The researcher targeted two senior secondary schools in Botswana that offer D&T.

The two pilot schools were randomly sampled based on proximity and availability. The response rate of school heads of the two senior secondary schools represents a 100% response rate. Simple random sampling was used to select the D&T teachers (three per school) and students (25 students per school) from the selected schools. A total of 46 D&T students, representing 96%, responded, and five teachers, representing 83% of the teachers, responded. Only one lesson was observed, representing 50% of the two lessons slated for observation.

This study, therefore, will be reporting on qualitative results of the pilot of the larger study.

4.1 Instrumentation

Questionnaires were developed for school heads, teachers and students based on the objectives and previous studies. The instruments were pilot-tested for content validity at two senior secondary schools. A reliability test of items, Cronbach Alpha Index of .987 for the teacher questionnaire, .852 for the school head questionnaire and .969 for the student questionnaire, was attained. This indicates that the questionnaires were reliable.

4.1.1 Lesson observation

The researcher conducted lesson observation for a pedagogical approach in terms of how the teacher uses technology and builds 21st-century skills. Only one lesson was observed, as opposed to two planned observations, as teachers primarily conducted tests during the data collecting stage.

4.1.2 Questionnaire

The student questionnaire comprised pedagogical approaches used by teachers. The students were asked to rate the teaching pedagogies and the teacher's ability to demonstrate 21st-century skills. A Likert scale of unsatisfactory, fair, good, very good, and excellent was used to determine the levels of knowledge of teaching pedagogy and 21st-century skills as perceived by students.

Decision-makers and researchers across all academic and industry sectors conduct research using questionnaires to uncover answers to a specific, important question (Hamed Taherdoost, 2019). The questionnaire was administered to students, teachers, and school heads. It consisted of questions about D&T pedagogy, 21st-century skills, participants' background information, and available resources to enable teaching and learning. Students were also requested to indicate their D&T test score mark, while teachers were asked to indicate the class mark.

4.1.3 Data analysis

Statistical Package for the Social Sciences (SPSS) is an application used to perform advanced statistical analysis, data analysis with machine learning algorithms, string analysis, and extensive data analysis that can be integrated to build a data analysis platform (Rahman and Muktadir, 2021). Using SPSS, variables were computed using items from the questionnaires.

4.1.4 Ethical clearance

This research abided by the ethical clearance governing any research conducted. Research ethics encompasses the researcher's professional conduct for the study and his/her awareness and protection of the rights of the participants (Cuschieri, 2022). For this study, ethical clearance was obtained from the Office of Research and Development at the University of Botswana and the Ministry of Education and Skills Development, which is responsible for coordinating educational research.

4.1.5 Consent

The researcher undertook the responsibility of seeking consent from participants, whether adults or students. There were students under 16 years old, and requests to participate in the study were sought from their teachers, school heads, and parents/guardians as

recognised representatives of these individuals. In order to take part in the study, students were requested to produce the consent forms from the teacher, school head and parents/guardians. Each participant was given a letter stating that their identity would always be kept confidential and that no third party would be involved; only the researcher would review the collected data. Participants were also made entirely aware that they could withdraw from the study at any time and would not be penalized.

5. Results

5.1 Research question 1

Which pedagogies are used by D&T teachers in Botswana senior secondary schools to support the attainment of 21st-century skills?

To answer this research question, the participants were asked to identify and rate the teachers based on the teaching methodologies demonstrated during class.

5.1.1 Level of knowledge of pedagogy assessment by students

A total of 46 students were asked to rate their teachers on a Likert scale of unsatisfactory, fair, good, very good and excellent on the identified pedagogical approaches used by teachers. Descriptive statistics using SPSS were used to establish the mean and standard deviation of the pedagogy. Figure 1 reflects various pedagogical approaches identified during the teaching and learning of D&T.

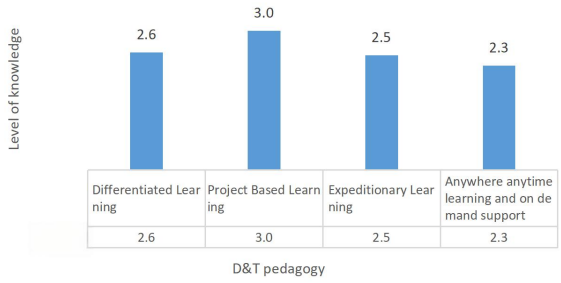

Figure 1 Level of Knowledge of D&T Pedagogy of Teachers by Students

It can be noted from Figure 1 that teachers were highly rated by students on the Project-Based Learning method (M=3.0, SD=1.2). According to the student's ratings, the teacher's knowledge and skills in project-based learning methods were 'good.' Students' perceived level of skill in differentiated learning (M=2.6, SD=1.2) and expeditionary learning (M=3.0, SD=1.5) suggest that teachers were 'good' at these methods. However, students perceived the teachers' skills in anywhere anytime learning and supported learning as 'fair' (M=2.3, SD=1.2).

5.1.2 Level of knowledge of pedagogy assessment by teachers

Five D&T teachers in the two senior secondary schools identified the following D&T pedagogies: differentiated learning, project-based learning, expeditionary learning, anywhere-anytime learning, and on-demand support. Teachers were asked to rate themselves on a Likert scale of aware, basic, practised, competent and proficient on the identified pedagogical approaches they use. The results are presented in Figure 2.

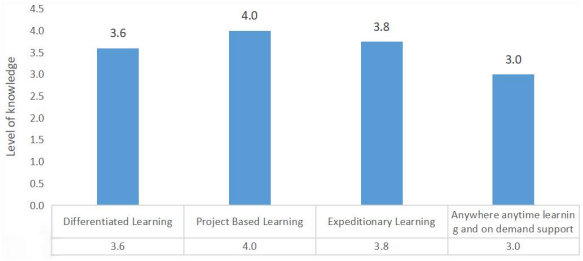

Figure 2 Level of Knowledge of D&T Pedagogy by Teachers

Teachers' level of skill and knowledge in Project-based Learning (M=4.0, SD=.7) suggests that they perceived themselves as 'competent', and this is higher than in other teaching pedagogies. Teachers also perceived themselves as 'competent' in expeditionary learning (M=3.8, SD =1.0) and differentiated learning (M=3.6, SD =.9). The level of skill in anywhere-anytime learning and on-demand support (M=3.0, SD =1.4) indicates a 'practised' level.

The level of knowledge and skills in D&T pedagogy was high in project-based learning, as perceived by both students and teachers, suggesting a perceived 'good' and 'competent' level.

5.1.3 Level of knowledge of 21st century skills

The participants were asked to rate the teacher's level of 21st-century knowledge and skills attained during class delivery. The results of the level of knowledge and skill are shown in Table 1.

Table 1 Level of Knowledge of 21St-century Skills

Skill	Stud. Mean	SD	Teach. Mean	SD	S/HeadMean	SD
Crit.Thinking	3.1	0.9	3.6	0.9		
Creativity	3.2	1.1	3.6	0.9		
Collab...	2.4	1.0	3.0	0.8	2.5	0.71
Comm…	3.1	0.9	4.0	0.8		
Leadership	2.9	1.1	2.8	1.3		
Assessment	2.1	0.8				
Tech. Aids	1.9	0.9	3.8	0.5	3.1	0.18
Tech. teaching	2.0	1.0	3.0	1		

Students and teachers highly rated the following common skills: Students indicated that their level of critical thinking skills was perceived as 'practised' (M=3.1, SD=.9). This suggests that students perceive teachers to demonstrate good critical thinking skills. The teachers indicated that their level of critical thinking was 'competent' (M=3.6, SD=.9), which implies that teachers perceived their critical thinking skills as 'competent.' The students rated their teachers' creativity skills as 'good' (M=3.2, SD=1.1). In contrast, teachers rated themselves on creativity as 'competent' (M=3.6, SD=.9). The students rated their teachers' communication skills as 'good' (M=3.1, SD=.9), while teachers rated their communication skills as 'competent' (M=4.0, SD=.8).

Since the school heads were responsible for coordinating the school, they were able to rate the teachers on collaboration and teaching aids rather than classroom operations. School heads have rated the teachers' practised on collaboration (M=2.5, SD=.5) and teaching aids (M=3.1, SD=.2).

5.2 Research question 2

To what extent do D&T pedagogical approaches used by teachers demonstrate 21st-century skills?

5.2.1 Correlation between Project-based Learning and 21st-century skills as perceived by students

A positive, significant correlation between PBL and the 21st-century skills: Critical thinking, r (43) =.5, p=. 01, Creativity, r (44) = .4, Communication, r (42) = .4, p=.01. This implies that there is a relationship between PBL and 21st-century skills, meaning an increase in the teacher's knowledge and skills on PBL as perceived by students and an increase in the demonstration of these three skills.

5.2.2 Level of knowledge of PBL to attain skills of 21st century

1) Critical thinking

To determine the level of knowledge of PBL to support attaining the 21st-century skills, comparing means was used. Figure 3 reflects that as the perceived mean for PBL by students increases, the mean for demonstration of critical thinking skills increases. Students who perceived teachers as very good and excellent in PBL knowledge had the highest critical thinking mean (M=3.4, SD=.9 and M=4.1, SD=.7), respectively.

Similarly, students who perceived teachers as unsatisfactory and fair in PBL knowledge had the lowest critical thinking mean (M=2.8, SD=.8 and M=2.7, SD=.5), respectively.

The results show that the level of PBL skills perceived by students increases with the level of critical thinking skills of the students.

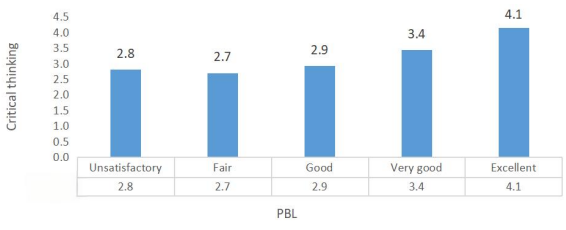

Figure 3 Effectiveness of PBL on Critical Thinking Skill

2) Creativity skills

To determine the level of knowledge of PBL to support attaining the 21st-century skills, comparing means was used. Figure 4 reflects that as the perceived mean for PBL by students increases, the mean for demonstration of creativity skills increases. Students who perceived teachers as very good and excellent in PBL knowledge had the highest creativity mean (M=3.4, SD=1.83 and M=4.0, SD=.8), respectively.

Likewise, students who perceived teachers to be unsatisfactory and fair while practicing PBL had the lowest mean of creativity (M=2.6, SD=1.0 and M=2.8, SD=.9), as reflected in Figure 5.

The results show that the level of PBL skills perceived by students increases with the level of creativity skills of the students.

Figure 4 Effectiveness of PBL to Attain Creativity Skill

3) Communication skills

Figure 5 reflects that PBL is often associated with enhancing communication skills. Teachers with good (M=2.8, SD=.8), very good (M=3.1, SD=.8), and excellent (M=4.1, SD=.7) knowledge of PBL taught students with high communication skills, as shown in Figure 5.

Figure 5 Effectiveness of PBL to Attain Communication Skill

It can be noted in Figure 5 that the level of knowledge of the D&T teacher increases with the level of communication demonstrated. Students who perceived teachers' skills on PBL as unsatisfactory and fair (M=2.6, SD=.6 and (M=3.1, SD=.6) tend to say the teachers' demonstration of communication skills is at a lower level. The level of communication skill as perceived by the students was high when PBL was high: good (M=2.8, SD=.8), very good (M=3.1, SD=1.2) and excellent (M=4.1, SD=.7), respectively.

5.3 21st-century skills on student D&T performance

The correlation between student test scores and 21st-century skills was conducted to determine whether there is a relationship between 21st-century skills and D&T performance.

There was no significant correlation between critical thinking skills and student D&T test scores: r (29) = (.4), p = .01. This suggests that there is not enough evidence to prove this occurrence.

There was no significant correlation between creativity and student D&T test score: r (31) = - .1, p = .01, and communication skill: r (30) = - .03, p = .01. This suggests that neither creativity nor communication skills, as assessed in this study, significantly influenced students' academic performance in D&T.

5.4 Correlation between Project-based Learning and 21st-century skills as perceived by teachers

There was no significant correlation of teacher results between PBL and the 21st-century skills: critical thinking: r (4) = -.5, p = .01, creativity: r (4) = .00, p = .01, and communication: r (4) = .8, p=.01. These results suggest that, according to teachers, PBL does not have a significant impact on the development of these key skills.

There was no significant correlation between PBL and credit pass rate: r (4) = .3, p=.01. This suggests that PBL does not show a statistically significant relationship with the rate at which students achieve credit passes, as reflected in Table 7.

5.5 21st-century skills on D&T teacher performance

To determine the relationship between 21st-century skills and D&T teacher performance, a correlation between class D&T credit pass and 21st-century skills was conducted.

There was a significant correlation between creativity skill and D&T credit pass: r (2) = .9, p = .01. This indicates a very strong positive relationship, suggesting that higher creativity skills are closely associated with achieving credit passes in D&T. This is also a large effect relationship varying above r = .5, this indicates a strong relationship which can bring about practical or significant impact. There was no significant correlation between credit pass rate and 21st-century skills, critical thinking (r (4) = .8, p = .01) and communication (r (3) = .9, p = .01). These results suggest that there is no strong relationship between credit pass rates and these specific 21st-century skills.

Further analysis indicates that creativity skills can enhance credit pass rates. Teachers with perceived 'practised' and 'proficient' levels of creativity have higher D&T class credit pass rates (M=1.3 and M=3.0, respectively). Furthermore, as reflected in Figure 6 the level of knowledge of creativity skills increases with the class credit pass rate.

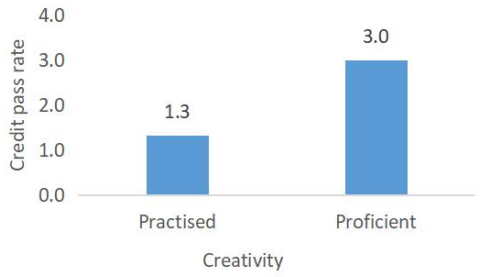

Figure 6 Creativity on the Credit Pass Rate

6. Discussion

Students who perceived their teachers to have a high level of PBL knowledge also reported higher levels of critical thinking, creativity, and communication skills. This underscores the importance of incorporating PBL into D&T pedagogy to cultivate and enhance 21st-century skills among students. These findings were also synonymous with the findings by Williams, Ashley & Capraro, Robert (2017), which revealed that the PBL in STEM education programs could help students enhance their 21st-century skills by learning how to solve real-world problems based on authentic and real-life experiences through project work.

The results from this study indicate that both students and teachers demonstrate a notably higher perceived knowledge level on the Design and Technology project-based learning method in comparison to alternative instructional approaches. This suggests a positive reception and understanding of the D&T project-based learning method among the surveyed participants. Zakariya, Yusuf & Ibrahim, & Adisa (2016) also found a significant mean difference between the performance of students exposed to PBL (ME=10.5, SE = 1.2) and those exposed to traditional methods (ME=7.9, SE=.3), t (112) =1.9, p< .05.

The study's results revealed substantial perceived proficiency among both teachers and students in critical thinking, creativity, and communication skills. This suggests a strong foundation and understanding of these essential competencies among the participants surveyed. The results corroborate those of Essien et al. (2020), who found that the level of communication skills competence was high, with a mean value of 4.164, while the level of critical thinking was moderate, at 3.8.

The results indicate that while there is a strong correlation between PBL and the development of 21st-century skills, no significant correlation was observed between PBL and student academic scores in D&T. Teachers' responses revealed that there was no significant relationship between PBL and D&T credit passes. This suggests that the impact of PBL on academic performance in D&T may not be directly reflected in traditional assessment scores, highlighting the need for comprehensive evaluation methods to capture the diverse skill sets developed through PBL.

7. Conclusion

This study affirms the value of PBL in nurturing critical thinking, creativity, and communication skills within the D&T context. By integrating PBL into pedagogical practices, educators can effectively support students in acquiring essential 21st-century

skills crucial for both academic and professional success.

Practical implications of this study suggest that D&T teachers should be provided with continuous professional development focused on designing, facilitating, and assessing PBL activities that promote collaboration, innovation, and problem-solving. Curriculum developers and policymakers should also consider embedding PBL principles into national D&T syllabi and assessment frameworks to ensure alignment between learning objectives and 21st-century skill development. Furthermore, schools should create supportive environments that provide adequate resources, time, and interdisciplinary collaboration to enhance the implementation of PBL. However, the study's findings are limited by factors such as sample size, geographical focus, and possible variations in teachers' understanding and application of PBL strategies. Additionally, the study may not have fully captured long-term impacts of PBL on learners' performance or its scalability across different educational levels.

Future research should explore longitudinal studies to assess the sustained impact of PBL on students' skill acquisition and employability. Comparative studies across regions and subject areas could provide deeper insights into contextual influences on PBL effectiveness. Further investigations into digital and hybrid models of PBL particularly those integrating emerging technologies like AI, AR, and VR could also reveal new possibilities for enhancing engagement and learning outcomes in D&T education and beyond.

Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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References

Botswana government (2015). Botswana Education & Training Sector Strategic Plan(ETSSP, 2015-2020). Retrieved from www.gov.bw/Global/MoE/Acts/MOESD%20ETSSPEDUCATION%20STRATEGY%20approved%20version%20II.pdf on the 23 August 201.

Botswana Education for All 2015 National Review. (2015). Gaborone: UNESCO.

Cuschieri, S. (2022). Understanding Research Ethics. In: A Roadmap to Successful Scientific Publishing. Springer, Cham. https://doi.org/10.1007/978-3-030-99295-8_2

Essien, A., Bukoye, O. T., O'Dea, X., & Kremantzis, M. (2024). The influence of AI text generators on critical thinking skills in UK business schools. Studies in Higher Education, 49(5), 865–882. https://doi.org/10.1080/03075079.2024.231688

Guàrdia, L., Mancini, F. Jacobetty, P., and Maina, M. (2021). The role of soft skills in the labor market. *International Journal of Educational Management,* 35(2), 123-135. doi:10.1108/IJEM-07-2020-0274.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study. *International Journal of Social Research Methodology*, 19(1), 67-76.

Hamed Taherdoost, 2019, What Is the Best Response Scale for Survey and Questionnaire Design; Review of Different Lengths of Rating Scale / Attitude, Scale / Likert Scale, *International Journal of Academic Research in Management*, Vol. 8, No. 1, 2019, Page: 1-10., Available at SSRN: https://ssrn.com/abstract=3588604.

Idrus, R. L., & Saleh, S. F. (2022). Profile Technological Pedagogical Content Knowledge (TPACK) Guru Sekolah Dasar Pada Materi Geometri Ditinjau Dari Pengalaman Mengajar.

Papadakis, S., Kiv, A. E., Kravtsov, H., Osadchyi, V. V., Marienko, M. V., Pinchuk, O. P., ... & Semerikov, S. O. (2023). Revolutionizing education: using computer simulation and cloud-based smart technology to facilitate successful open learning. In Joint Proceedings of the 10th Illia O. Teplytskyi Workshop on Computer Simulation in Education, and

Workshop on Cloud-based Smart Technologies for Open Education (CoSinEi and CSTOE 2022) co-located with ACNS Conference on Cloud and Immersive Technologies (No. 3358, pp. 1-18). CEUR Workshop Proceedings.

Papadakis, S., Kiv, A. E., Kravtsov, H. M., Osadchyi, V. V., Marienko, M. V., Pinchuk, O. P., ... & Striuk, A. M. (2023). Unlocking the power of synergy: the joint force of cloud technologies and augmented reality in education. In Joint Proceedings of the 10th Workshop on Cloud Technologies in Education (CTE 2021) and 5th International Workshop on Augmented Reality in Education (AREdu 2022), Kryvyi Rih, Ukraine, May 23, 2022. CEUR Workshop Proceedings.

Rahman, Arifa & Muktadir, Md Golam. (2021). SPSS: An Imperative Quantitative Data Analysis Tool for Social Science Research. V. 300-302. 10.47772/IJRISS.2021.51012.

Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying Critical 21st-Century Skills for Workplace Success: A Content Analysis of Job Advertisements. Educational Researcher, 49(2), 80-89. https://doi.org/10.3102/0013189X19890600.

Timans, R., Wouters, P. & Heilbron, J. (2019). Mixed methods research: what it is and what it could be. Theor Soc 48, 193–216. https://doi.org/10.1007/s11186-019-09345-5

Williams, Ashley & Capraro, Robert. (2017). Science, Technology, Engineering, and Mathematics Project-Based Learning: Merging Rigor and Relevance to Increase Student Engagement.

Wibomo, H., Herliani, H., & Limbong, E. (2023). Pengalaman Menerapkan TPACK Pada Pembelajaran Daring Di Masa Pandemi Covid-19 Alumni Mahasiswa PPG Dalam Jabatan FKIP Universitas Mulawarman. 4.

Zakariya, Yusuf F & Ibrahim, M.O. & Adisa, L.O. (2016). Impacts of Problem-Based Learningon Performance and Retention in Mathematics among Junior Secondary School Students in Sabon-Gari Area of Kaduna State. 9. 42-47.

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